Art. XV.—*Note on the Stony Creek Basin, Daylesford.*

By T. S. HART, M.A., F.G.S.

(With Plates XXV., XXVI.).

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The Stony Creek Basin is a relatively low-lying area of about 50 acres situated a short distance to the south of Daylesford. The Stony Creek enters the basin at its south-west corner, flows along its west side, and leaves it at the north-west corner by a narrow gorge. The locality has been mapped in Quarter-sheet 16 S.E. of the Geological Survey of Victoria. The northern and western banks of the basin are capped by basalt, and present a level surface divided by the gorge through which the creek flows out. On both these sides deep leads occur under the basalt, but at higher level than the floor of the basin. On the other two sides the Ordovician bedrock extends to the summit of the bank and reaches levels rather higher than the basaltic plateau. The road from Daylesford to Ballan runs along the top of the east bank. The old alluvials have been worked by tunnels, and also appear on the surface at the north-east corner of the basin.

The central portion of the basin is nearly level, rising towards the east and north sides. Numerous sluicing channels intersect the basin, and expose black clays and shales containing (in the shales) fossil leaves, (eucalyptus, etc.) fruit, (banksia, etc.), and a few coleoptera. The dips of these beds are irregular, both in amount and direction, reaching 45 degs. at one place, where the bedding is most distinct, and possibly vertical on the eastern side of the basin, but the bedding here is obscure. The black clays and shales are covered by newer accumulations on the east and north sides derived from the disintegration on the rocks forming the upper parts of the banks, and hence differing in character. The Stony Creek itself does not expose the black clays and shales, nor are they seen to the west of the creek. The steep banks are much affected by landslips on the east and west sides.

It is evident that though a portion of the basin is occupied by lacustrine deposits, they have been much disturbed since their deposition. The depth to which the black clays extend has not been certainly proved. The shaft of the Grand Mystery Company is the deepest of which I have found any record. The "Daylesford Express" of March 17, 1864, writing of the fourth attempt of this party to bottom the basin, says:—"The drift has been safely gone through in the new shaft, which is about 110 feet from grass, and the bottom of which is covered with waterworn boulders, indicative of the nearness of the gutter. Gold in small quantities has already been found in the shaft." . . . . On April 9 the same paper says:—"This company struck the reef last week at 111 feet, when a large quantity of water flowed in. A prospecting drive was then put in eastward, but after driving 20 feet the black clay was struck in the face of the drive, when it was determined to sink the shaft deeper and open to the north. After supplying new timber to the shaft in the place of that which had been broken by the swelling of the black clay, the further sinking of the shaft was commenced, and it was found that the reef dipped rapidly, one-half of the shaft being in headings, the other in reef at 117 feet. A fair prospect was washed, and it improves as the shaft progresses." Reef in these notices, according to usage of alluvial mining, means bedrock. Beyond this I find no reports of the company's operations except a notice of a 10s. call.

Local miners call this black clay "dyke," and they apply the same term to what is probably a fault rock exposed in the next valley. It is quite possible that they had reached bedrock long before, but had not recognised it till the footwall of the fault was met. This supposition is in accordance with the fact that the shaft was close to the side of the basin, which is here very steep above the level of present surface in the basin, and must continue very steep below. Most likely the limit of the basin on this, the southern, side is a fault. The so-called water-worn boulders may easily have been broken and worn fragments of the bedrock.

It is certain, however, that the floor of the basin lies well below the present creek level, and much below the levels of the deep leads. Its present position is not its original position, and

we need seek no explanation of how a basin of this depth could have been formed and filled. Local opinion frequently refers it to volcanic explosions, of which, however, there are no indications at all. There are no volcanic fragmental rocks, and the lava flows do not originate here.

On the other hand, a number of observations favour the view that there has been here a local subsidence. In the valley of Sailor's Creek, the next valley, at a point north-west of the basin, there is marked on the geological map a broad "dyke" connected by dotted lines with the large Corinella dyke at Eganstown. The gravel in the creek bed conceals much of this area, but wherever I have seen it, it consists of a greyish paste in which are irregularly distributed fragments of the Ordovician bedrock, often of considerable size. It is a belt of fault rock, of considerable width, perhaps accompanied by some intrusive material, though I have seen none here. An undecomposed basaltic dyke occurs a short distance to the south. This belt of broken rock would naturally not be detected on the hillsides, but conversations with the miners give some support to the view that it extends towards the basin and occurred in the tunnel workings between the place where it is seen and the basin. Similar broken ground seems to occur also in workings in a gully west of Sailor's Creek. At Eganstown the Corinella dyke is shown on the map with a width of 10 or 12 chains. At its western end it is surmounted by scoriaceous material, forming a low hill; further west in the Deep Creek it appears only as a few thin dykes. East of Eganstown it is exposed with much diminished width in a quarry. A few decomposed dykes are seen in the road cuttings west of Sailor's Creek, and some distance further east beyond the basin similar dykes occur in the cuttings of the Ballarat railway and in the creek bed east of the Jubilee Lake. Continuing, the line leads to Wheeler's Hill, an old point of eruption. If the line were continued to the west it would pass through Mount Moorookyle and McDonald's Hill and others beyond, but the number of these volcanic hills makes coincidence less important. The basin appears to be situated on a line of weakness at the time of the volcanic activity. It lies directly on a line between the hill on the dyke at Eganstown and Wheeler's Hill, and about

midway between them. Black clays similar to those of the basin are found also under the basalt at Sailor's Fall (the same flow which passes the basin) and north of Daylesford railway station, also under volcanic rocks. Here, at the Exchequer Company's shaft, the upper parts were shaly. It is probable that the shaly parts are also uppermost at the basin.

The probable sequence of events is as follows:—The black clays were deposited prior to the volcanic activity, or perhaps during the first modifications of the drainage system by volcanic action. Subsequently, by subsidence on the course of a well-defined line of weakness, a portion of these black clays have been depressed below the levels of the surrounding country. The creeks of the period flowed west and north of the basin, and may have flooded it. A branch from the lead seems to enter the basin; this would correspond to a diversion of part of the stream into the subsided area. (The lead on the north side is probably a tributary; there is also a small area of basalt east of the Ballan road not shown on the map.) The lava streams from Leonard's Hill have then buried these old valleys, and perhaps part at least of the area of the basin. A part of the waters then flowed down the western side of the basalt forming the present Sailor's Creek. The eastern tributaries formed the present Stony Creek. The course of this creek cutting across the basalt at the outlet from the basin was only able to deepen slowly at this place. While its level was thus maintained it cut out a plain at the site of the basin in these easily-eroded materials. A considerable area of basalt could have been removed at the same time by the creek undercutting it if rested on these clays. When the basaltic barrier at the outlet was cut through, this flood plain was finally deserted, and the talus from the weathering of the steep banks on the north and east sides to some extent covered the plain. It would seem uncertain how much of the disturbance of the east bank is due to the original subsidences and how much to later landslips. It will be noticed that this explanation regards the basin not as a filled-in lake, but as a flood-plain of the creek, formed because of the presence of the easily-eroded lacustrine deposits and the maintenance of the creek level by the basaltic barrier; but

preserving a remnant of once more extensive beds on account of their having been locally depressed.

This adds another to the numerous instances now known showing that local disturbances of deposits about the age of our deep leads occur, and that consequently it is not safe to assume that in working the deep leads they will maintain without variation their original slopes. As early as 1875 Mr. R. A. F. Murray called attention to the difficulty in explaining the direction of fall in some of the Ballarat leads,[1] and noted an instance at Buninyong of a lead dipping both ways.[2] I have since shown that local subsidences can explain the disturbance at this locality, though I suggested a possible explanation also by a succession of volcanic vents.[3]

In 1882 a fault was met with traversing the gutter at the Hepburn Home Paddock Gold Mine. It produced an abrupt change of level in the lead of 23 feet, followed by a greater dip than usual for the next 500 feet of the lead down stream. It is shown in a section prepared by the manager (Mr. J. T. McKenna), and now in the possession of the Ballarat School of Mines. Local subsidences have also recently been given by Professor Gregory as the explanation of an area occupied by tuffs in the workings of the Spring Hill and Central Mine,[4] and for various lakes in the Western District of Victoria.

In conclusion, I desire to thank Mr. H. Herman for a tracing of an unpublished map of the basin made by Mr. S. Hunter.

References.

1.—Geology and Mineral Resources of Ballarat. R. A. F. Murray: Progress Report Geological Survey of Victoria, No. I., pp. 76, 77.

2.—Ibid, Figure 16.

3.—Proc. Roy. Soc. Vic., vol. xii., part 1.

4.—Bulletins of the Geological Survey of Victoria, No 1.

DESCRIPTION OF PLATES.

No. XXV.—Plan showing the position of Stony Creek Basin, and its relation to the Corinella Dyke.

XXVI.—Plan of the Basin on a larger scale.